WHAT IS CLAIMED IS:

1. A method of forming a silicon film by a plasma CVD method, comprising:

a first step of supplying a non-silicide gas for discharge into a decompression chamber;

a second step of supplying radio frequency energy in the decompression chamber to cause radio frequency discharge;

a third step of supplying a silicide gas into the decompression chamber and at the same time, stopping supply of the non-silicide gas; and

a fourth step of forming a silicon film by radio frequency decomposing the silicide gas.

2. A method according to claim 1, wherein a pressure in the decompression chamber at the second step is made equal to a pressure in the decompression chamber at the fourth step.

3. A method according to claim 1, wherein hydrogen is used as the non-silicide gas, and silane is used as the silicide gas.

4. A method according to claim 1, wherein the longest period of time t from a start of the discharge in the second step to a time when the discharge becomes stable, and a period of time T of film formation in the fourth step satisfy the relation of $10t \geq T$.

5. A method according to claim 1, wherein the silicon film is an amorphous silicon film, and wherein the method further comprises a step of obtaining a crystalline silicon film by carrying out crystallization after an end of film formation of the amorphous silicon film.

6. A method of forming a film, comprising:

a first step of supplying a non-product gas for discharge into a decompression chamber;

a second step of supplying electromagnetic energy into the decompression chamber to cause discharge;

a third step of supplying a product gas into the decompression chamber and at the same time, stopping supply of the non-product gas; and

a fourth step of forming a thin film by decomposing the product gas by the electromagnetic energy.

7. A method according to claim 6, wherein hydrogen is used as the non-product gas.

8. A method according to claim 6, wherein radio frequency energy having a frequency selected from a band of MHz to GHz is used as the electromagnetic energy.

9. A method according to claim 6, wherein silane is used as the product gas.

10. A method according to claim 6, wherein the longest period of time t from a start of the discharge in the second step to a time when the discharge becomes stable, and a period of time T of film formation in the fourth step satisfy the relation of $10t \geq T$.

11. A method of forming a film, comprising:

a first step of forming a film by causing radio frequency discharge to form plasma in a state where a film forming gas is supplied; and

a second step of forming plasma without film formation by substituting the film forming gas with a discharge gas and continuing the radio frequency discharge.

12. A method according to claim 11, wherein a pressure in an atmosphere at the first step and a pressure in an atmosphere at the second step are maintained at a constant.

13. A method according to claim 11, wherein silane is used as the film forming gas, and hydrogen is used as the discharge gas.

14. A method according to claim 11, wherein the radio frequency discharge is generated between parallel flat plate type electrodes, and a formed surface is disposed at a side of the electrode maintained at ground potential.

15. A method according to claim 11, wherein a period of time in which the second step is continued is longer than a period of time in which an atmosphere is substituted.

16. A film forming apparatus, comprising:

a first means for forming a film by causing radio frequency discharge to form plasma in a state where a film forming gas is supplied; and

a second means for forming plasma without film formation by substituting the film forming gas with a discharge gas and continuing the radio frequency discharge.

17. An apparatus according to claim 16, further comprising means for maintaining a pressure in an atmosphere in the first means and a pressure in an atmosphere in the second means at a constant.

18. An apparatus according to claim 16, further comprising means for supplying silane as the film forming gas, and supplying hydrogen as the discharge gas.

19. An apparatus according to claim 16, further comprising a parallel flat plate type electrode structure, wherein a formed surface is disposed at a side of an electrode maintained at ground potential.

20. A method of forming a film by causing radio

frequency discharge between parallel flat plate type electrodes and by a plasma vapor phase reaction, comprising the steps of: stopping supply of a film forming gas in a state where a self bias is applied to a formed surface, and at the same time, supplying a discharge gas so that the state where the self bias is applied to the formed surface is maintained even after an end of film formation.

21. A method according to claim 20, wherein a period of time in which the state where the self bias is applied to the formed surface is maintained after the end of the film formation is longer than a period of time in which an atmosphere is substituted.

22. A film forming apparatus for forming a film by causing radio frequency discharge between parallel flat plate type electrodes and by a plasma vapor phase reaction, comprising:

means for stopping supply of a film forming gas in a state where a self bias is applied to a formed surface, and at the same time, supplying a discharge gas so that the state where the self bias is applied to the formed surface is maintained even after an end of film formation.